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Transport of electrons on liquid helium in a microchannel device near the current threshold

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Abstract

© 2016, Pleiades Publishing, Inc.We study the transport of strongly interacting electrons on the surface of liquid helium confined in a microchannel geometry, near the current threshold point. The current threshold depends on the electrostatic confinement, created by the microchannel electrodes, and on the electrostatic potential of electron system. Depending on the geometry of the microchannel, the current pinch-off can occur at the center or move to the edges of the microchannel, as confirmed by Finite Element Model calculations. The confining potential dependence of electron conductivity above the current threshold point is consistent with a classical charge continuum model. However, we find that below the threshold point electron transport is suppressed due to charging energy effects.

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